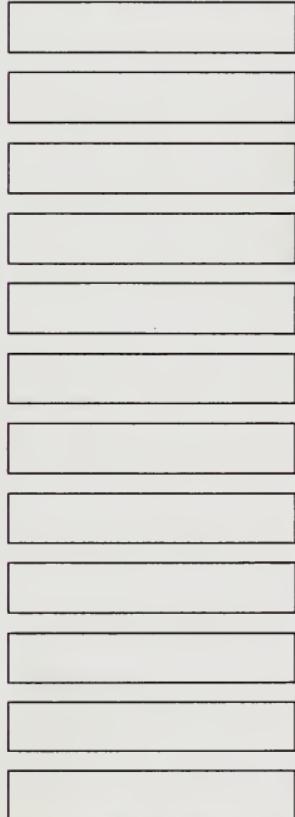


Executive Overview



CD ROM: User Applications

INPUT®



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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

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To Our Clients:

This summary is an excerpt from a full research report, CD ROM: User Applications, issued as part of INPUT's Information Systems Program (ISP). A complete description of the program is provided at the end of this Executive Overview.

If you have questions or comments about this report, please call INPUT at (415) 960-3990 and ask for the Client Hotline.



REPORT ABSTRACT

The key to office and white collar productivity is improved quality of information and reduction in the volume of paper. Most attempts at office automation have, on the contrary, increased the volume of paper and generally lowered the quality of information content. Optical storage holds the promise of reducing (or at least controlling) the paper volume and improving the quality of information by giving ready access to historical data and enabling the processing of information that is currently produced on paper (i.e., noncomputer-processable).

INPUT's report CD ROM: User Applications looks at the current user evaluation of CD ROM and optical storage, examines the technological impact on current storage media, and proposes seven profiles of optical storage systems that have end-user applications.

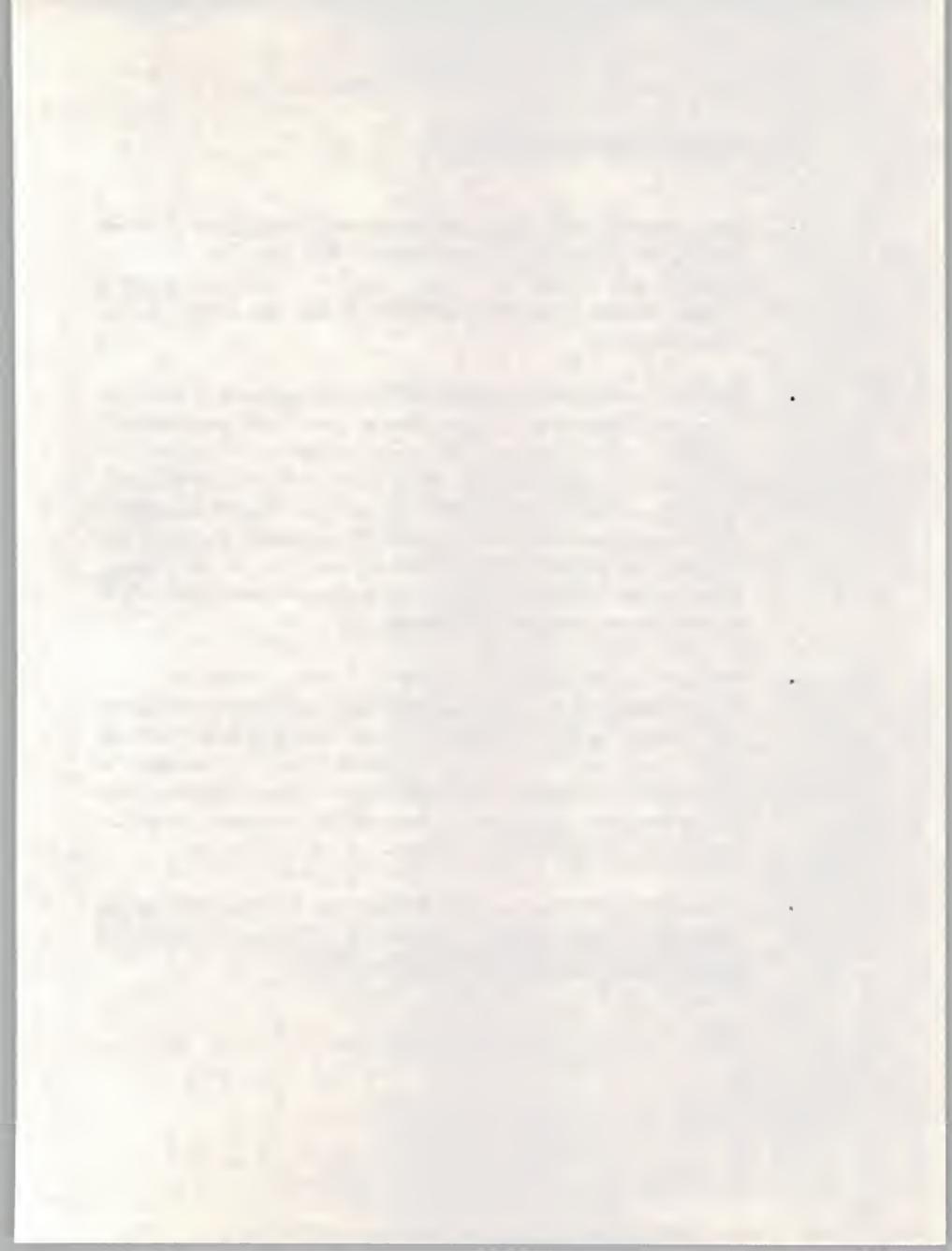
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A. WHO NEEDS OPTICAL STORAGE?

- The typical central DP facility currently has wall-to-wall magnetic disk drives installed and generates paper documents which enter the office environment. IS departments currently do not have CD ROM or other optical storage products installed, do not plan to install any, and seem generally disinterested in the technology.
- End users at all levels (management, professional, and clerical) currently have the ability to generate enormous quantities of "pretty" documents, and major emphasis in office automation is currently directed toward improving this capability with desktop publishing. There is every indication that the quality of information content produced from distributed data bases is substantially lower than that produced from the central DP facility directly. Vendors are directing their CD ROM efforts toward end users, and this will result in enormous data bases being available on the desktop with exacerbation of both paper volume and quality control problems.
- The cost of handling paper in U.S. offices is currently estimated to be over \$200 billion and rising. In addition, substantially more analysis time is being spent in screening out the meaningless (or even misleading) paper information which is being generated by office "automation" systems. The control of paper volume and quality is the key to improved white collar productivity. Optical storage has the potential for solving both of the problems which stand in the way of improved office productivity.
- Who should be interested in optical storage? Any institution which has the information handling problems described and any organization which has responsibility for doing anything about those problems.

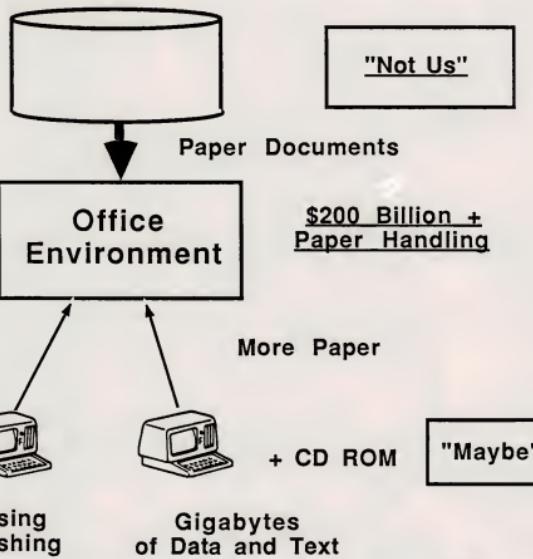


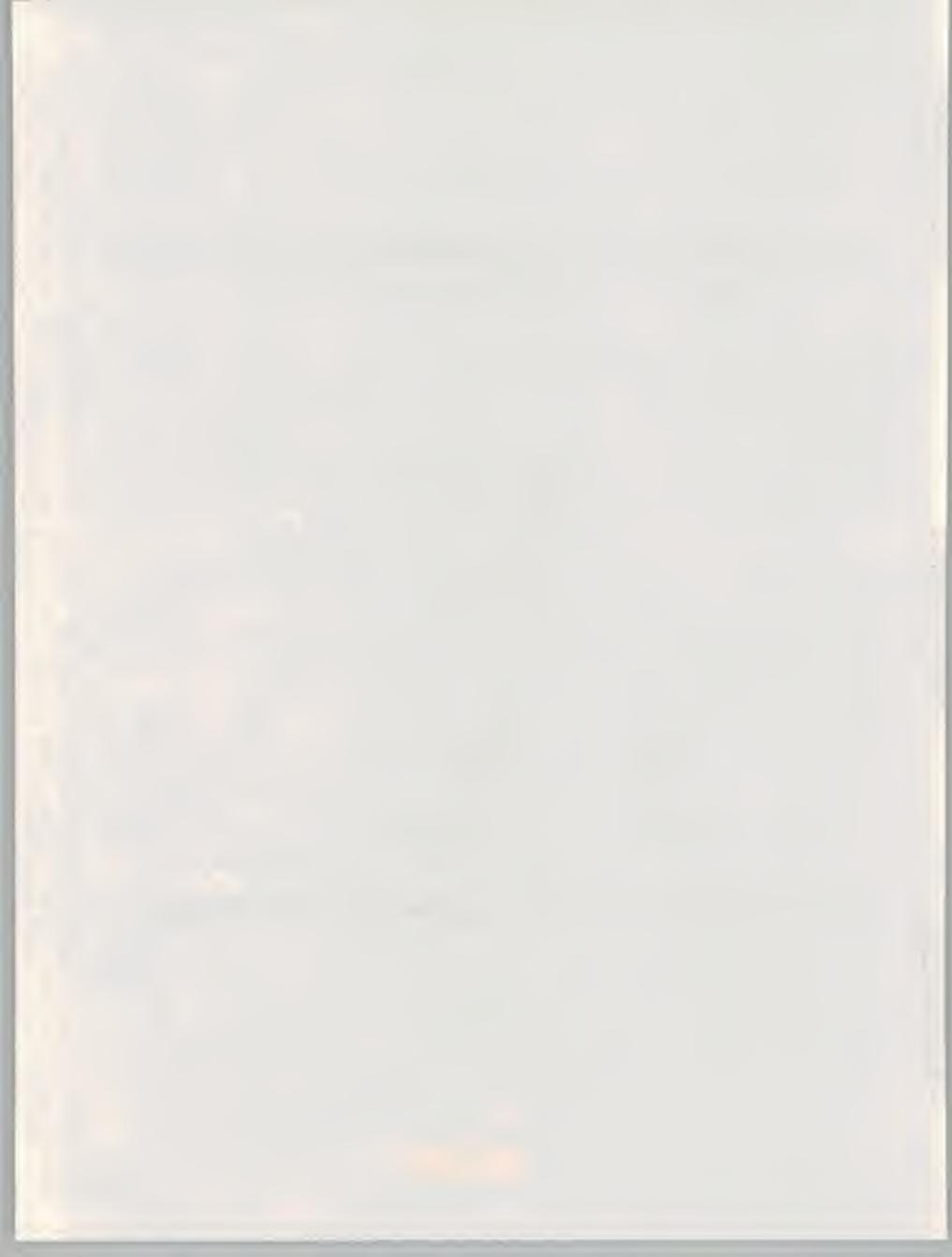
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WHO NEEDS OPTICAL STORAGE?

I.S.

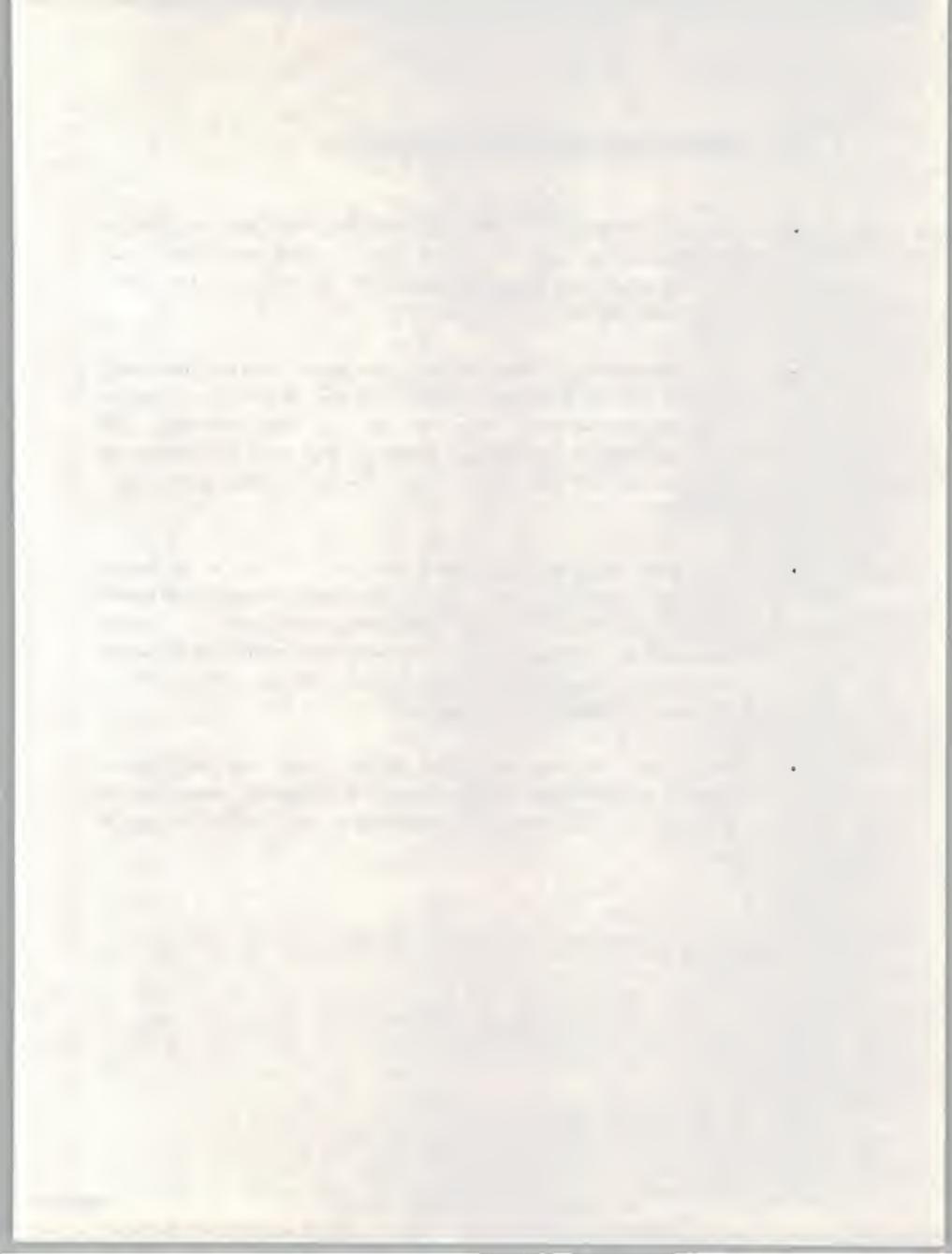
Users





B. WHY ARENT I.S. DEPARTMENTS INTERESTED?

- From among a menu of limitations of CD ROM (erasability, read only, slow file conversion, access time, absence of IBM), IS management seems most concerned about three issues: the expense of file conversion, the lack of standards, and the lack of software.
- These are legitimate concerns, but there was also an underlying tone which suggested that CD ROM and optical storage were of low priority because today's problems were too pressing to worry about future technology. The types of problems IS management is concerned about today are departmental processing, end-user computing, micro-mainframe links, LANs, and connectivity.
- All of these problems are concerned with what was once simply labeled distributed processing. Distributed processing is specifically directed toward solving user problems in the office (paper processing and handling). Generally speaking, IS departments do not have (or want) responsibility for the paper-based systems and procedures; they are too busy wrestling with the "solutions" which have been proposed for the problem.
- Finally, after all of the explicit and implicit reasons were identified or inferred, an open-ended question reveals a fundamental cause for the disinterest in optical storage--everyone wants to know what IBM is going to do.



WHY AREN'T I.S. DEPARTMENTS INTERESTED?

What They Say -

- Expensive Conversion
- Lack of Standards
- Lack of Software

Practical Reasons -

- Too Busy
- More Important Problems
- Not Responsible

The Hidden Reason

- IBM "Leadership"

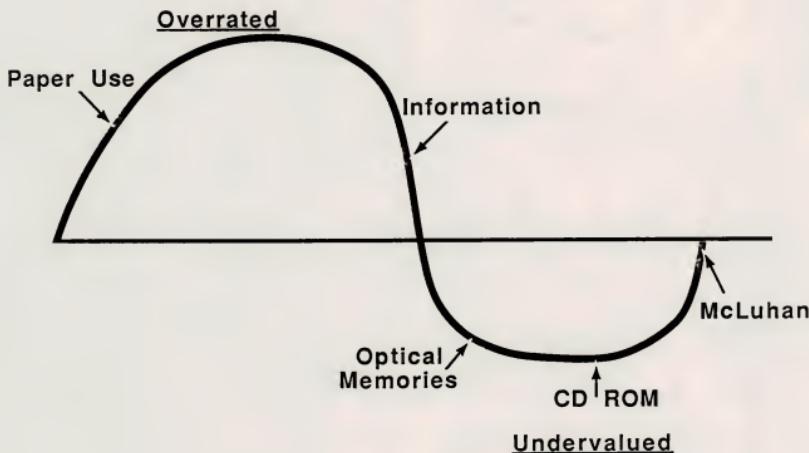


C. WHERE THINGS STAND

- Technological developments are first overrated and then undervalued. The importance of producing paper documents (and the use of paper itself) is approaching the apogee of the overrated phase of the cycle. Producing cosmetically better paper documents in greater volume is not going to improve productivity in the office. In fact, the point is rapidly approaching when current "solutions" will be identified as part of the problem.
- Optical storage, on the other hand, is at the nadir of the undervalued phase of the cycle, having already gone through the overrated phase several years ago. CD ROM is barely leading optical storage in gaining increased understanding and acceptance of the technology.
- The late Marshall McLuhan made certain observations about electronic versus paper media over 20 years ago. These observations, after an initial flurry of interest, were generally not understood and certainly were undervalued. IS departments are currently being confronted with the impacts of McLuhan's theories whether they understand them or not--the shortening of the time between thought and action can have unpredictable consequences as paper systems are converted to electronic systems. This, in turn, determines the quality (value) of information.
- Information as a "corporate asset" has been overrated because information systems have not produced promised results. There is the danger that data/information/knowledge will become undervalued with adverse impacts on the IS function far beyond the current slump.



WHERE THINGS STAND



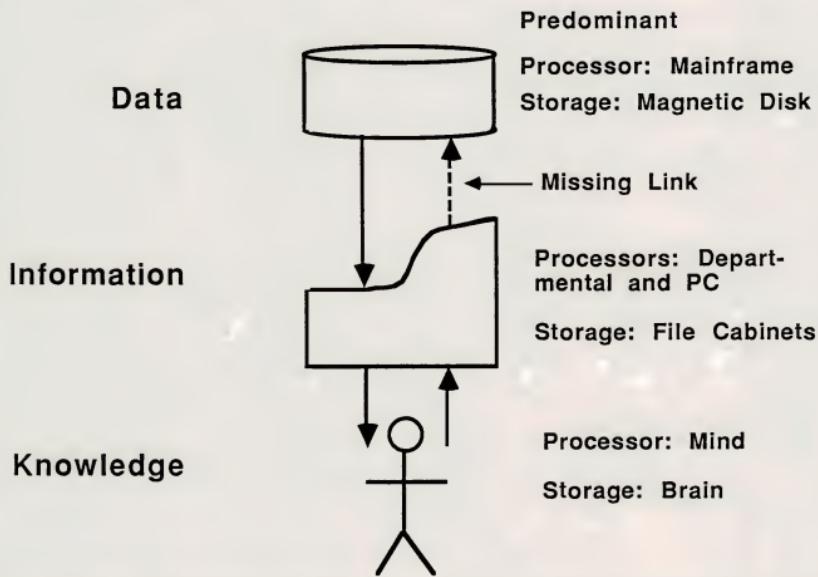


D. DATA/INFORMATION/KNOWLEDGE

- It is important for IS professionals to understand the characteristics of data, information, and knowledge and to accept responsibility for improving the quality of the "systems" which process and store all three.
- At the present time, the following general conclusions can be reached about data, information, and knowledge:
 - Data are the concern of the IS department, the processors are primarily mainframes, and the storage media is magnetic disk.
 - Information (despite the best efforts of data processing systems) is distributed primarily on paper, the processors for producing paper are primarily minicomputers and PCs, and the storage media are file cabinets, bookshelves, etc. End users are generally left to struggle with paper-based systems as they see fit (unless there is a "threat" to the IS function).
 - Knowledge is produced and stored in the minds and brains of human beings who increasingly are using computer/communications networks to obtain data and information. Users are the only justification for the existence of information networks and systems--information has no value without the human component. Users encounter increasingly complex systems as they deal with data and information.
- There is a missing link between paper information processing systems and computer data processing systems. What is missing is the ability of current data processing systems to capture information and knowledge which currently flows and is stored on paper. This should be the main concern of IS departments.



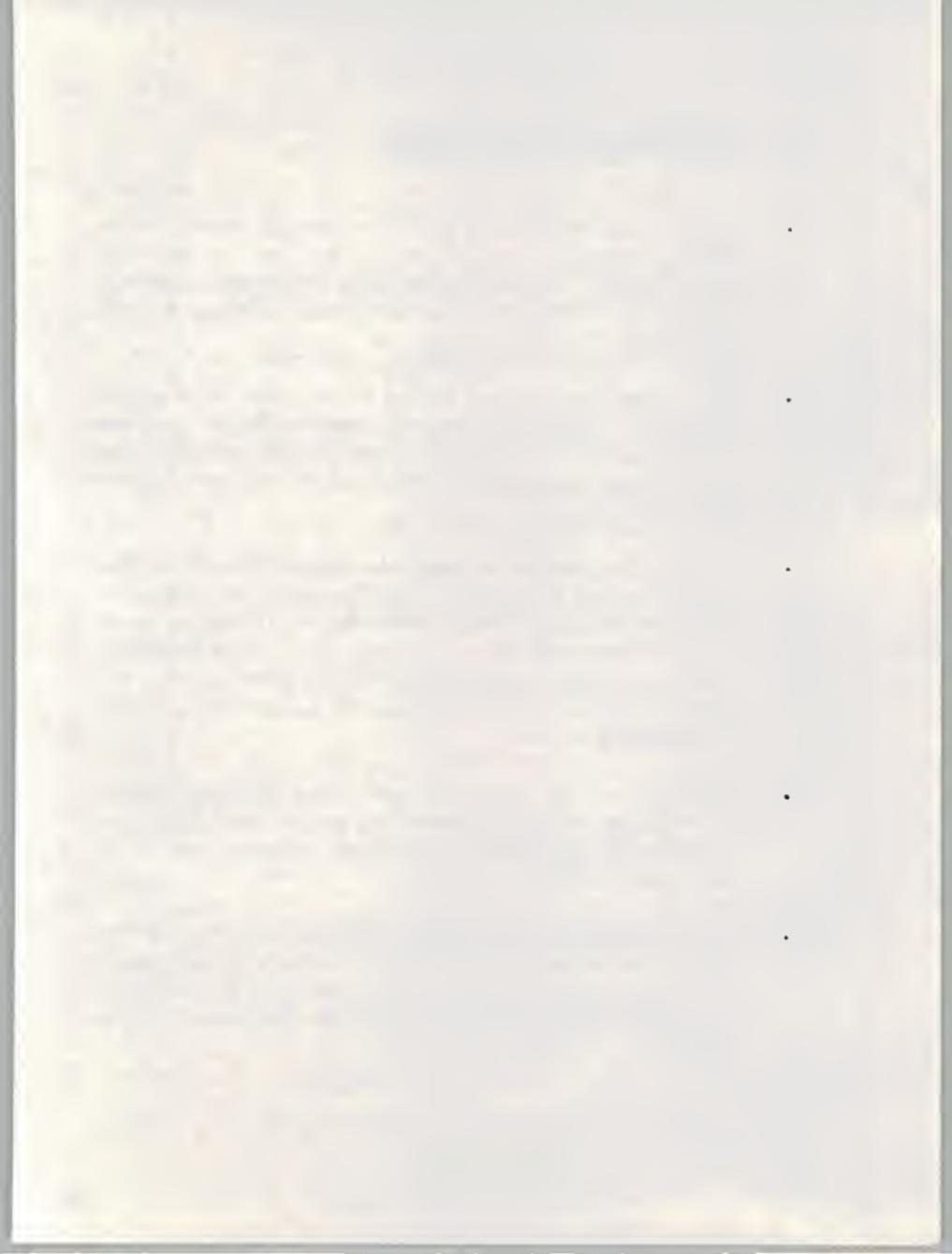
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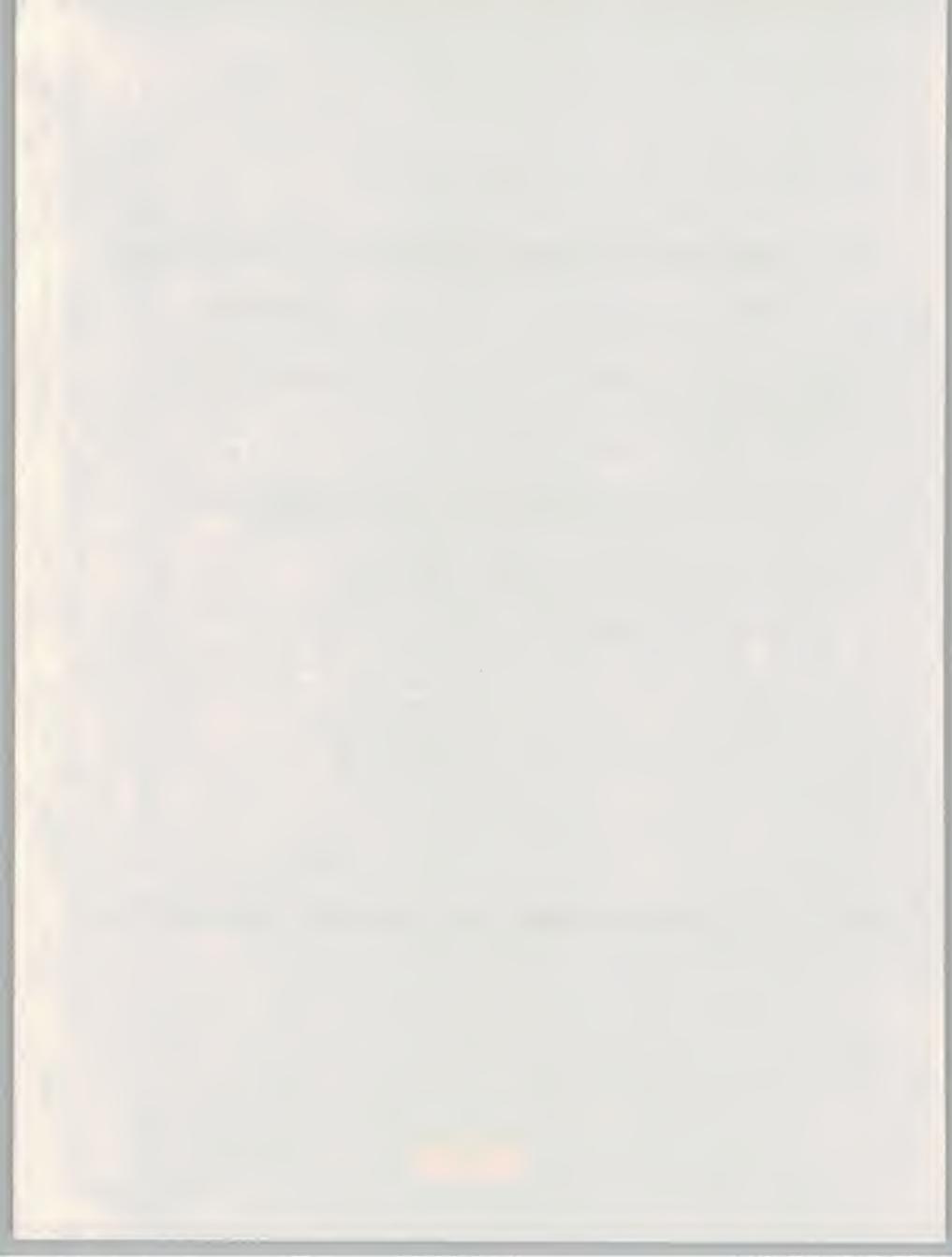
E. THE POTENTIAL OF OPTICAL STORAGE

- Optical storage provides a means of capturing and rapidly accessing the vast amounts of information which are currently stored on paper (and micrographics) media and which are, therefore, lost to data processing facilities. It also offers the ability to process that data (impossible with paper or micrographic media).
- This can be accomplished (and justified) by the reduced storage costs of optical media compared to both paper and magnetic media and by the fact that 90% of the data captured and information produced by information systems is never used because of the volume and the media used for outflow (paper and COM).
- By capturing the paper information and making it available in electronic form, the volume of paper information will be reduced and the flow of information between and among human beings and computers will be improved in terms of both availability (amount) but more importantly access. Boolean searches of paper files by humans are inaccurate and tiring and (ultimately) very costly. Optical storage allows the entire contents of (for example) 550 MB of storage to be searched in one second.
- The shift from paper to electronic media can be cost-justified based on reduction of the \$200 billion currently being spent on paper handling alone, but it should also be justified based on better utilization of the data and information already captured and paid for.
- All of the above can be accomplished (or at least begun) with CD ROM. However, the real payoff will eventually be from having the information in processable form and being able to improve the quality of the content of information. This can only be done with advanced hardware/software systems.



THE POTENTIAL OF OPTICAL STORAGE

- Capture Information Currently Stored on Paper
- Reduce Storage Costs
- Reduce Volume of Paper Information Flow
- Reduce Cost of Paper Handling
- Have Information in Processable Form



F. SYSTEMS REQUIREMENTS

- Over the last five years, there have been quite remarkable advances in the peripherals which will be necessary to develop an integrated image processing system. Most of this development has been occasioned by the remarkable advances of microprocessor technology and the acceptance of the personal computer as a personal productivity aid in the office.
 - High-resolution displays have been developed in response to the requirements for superior graphics which have arisen from applications on intelligent workstations. The advances in microprocessor technology have been required to make the development of such displays economically feasible, and they are now available for more mundane image processing applications.
 - Desktop publishing as the logical outgrowth of conventional word processing also requires advanced graphics capability and print capability well beyond letter quality correspondence. The result has been dramatic advances in laser printers which are now the fastest growing printer market area.
 - Intelligent scanners and cameras are also appearing as the result of microprocessor advances, and fiber optics seems to have arrived just in time to provide the anticipated bandwidth necessary for office communications where paper begins to play a secondary role.
 - Indeed, the arrival of optical storage itself seems to be the last component required, and the various technologies (including erasability) appear to be arriving pretty much on the schedule predicted by INPUT over three years ago. Hardware is not a limiting factor in the development of advanced image processing systems.



SYSTEMS REQUIREMENTS

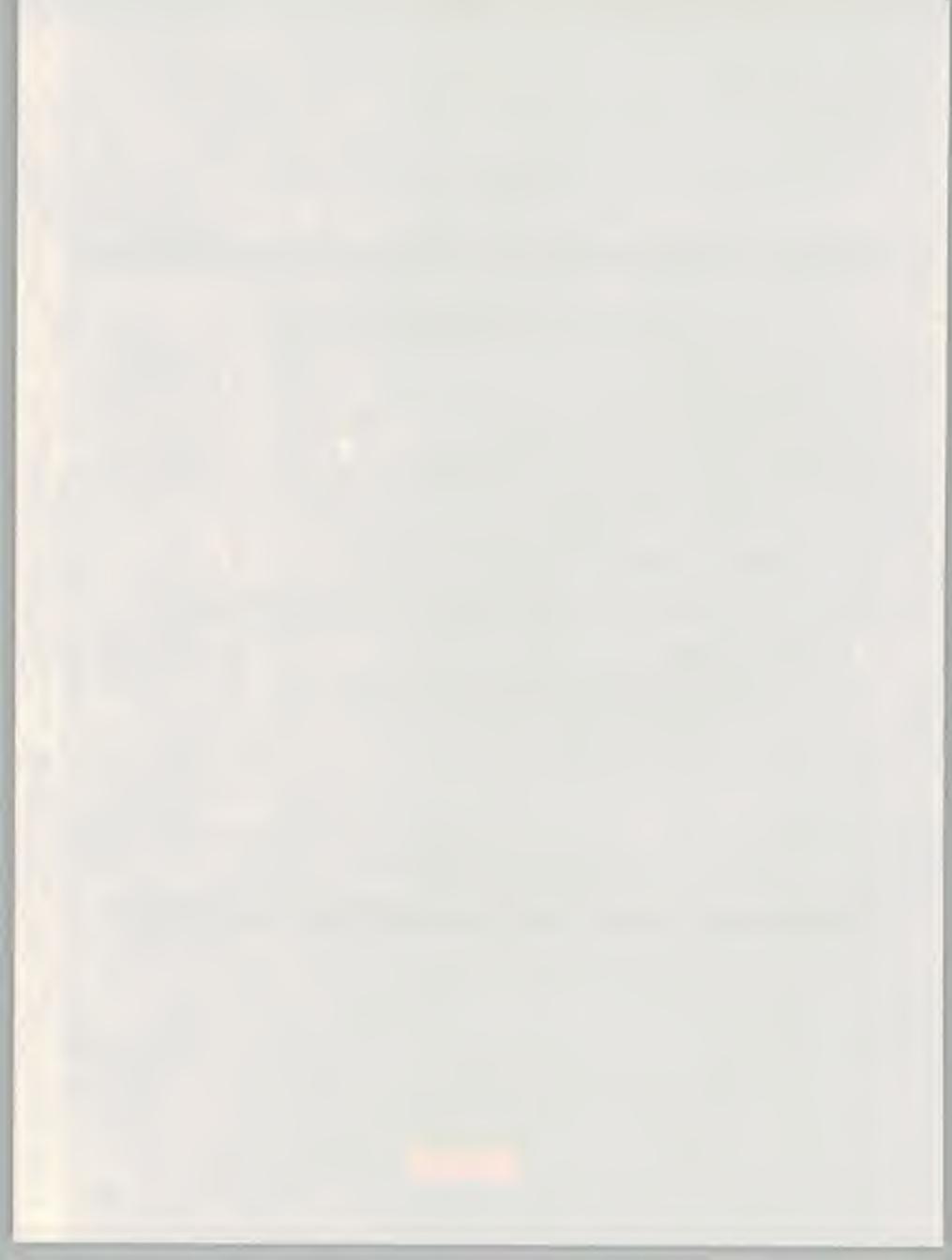
Hardware

- Scanners/Cameras**
- High-Resolution Displays**
- Laser Printers**
- Broadband Communications**
- Continuing Development of Optical Media**

Software

- D/I/K Management Systems**
- Intelligent D/I/K Flow**

D/I/K = Data/Information/Knowledge



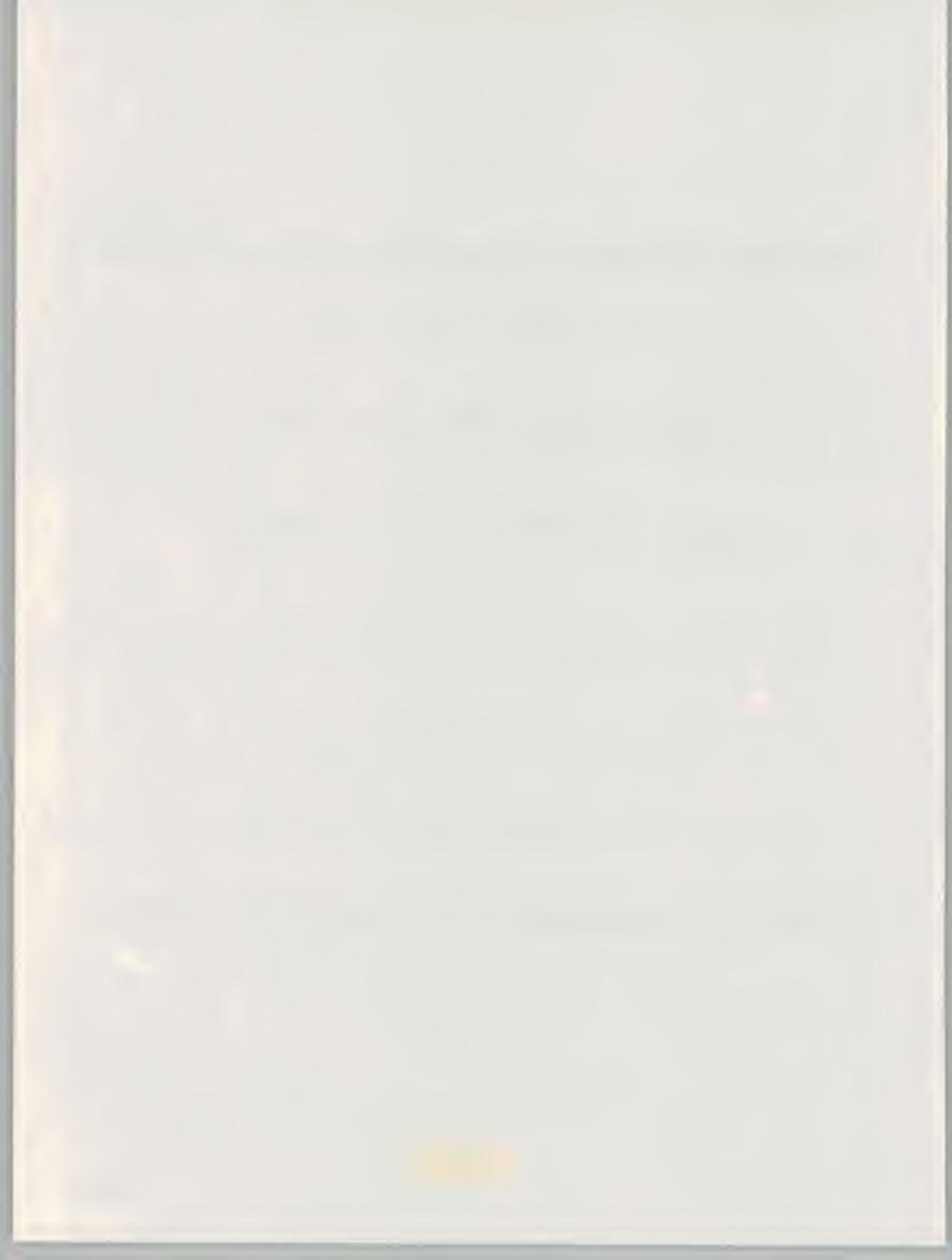
G. I.S. RESPONSIBILITIES

- Unlike personal computers where end users pioneered use of the technology, the complexity of a fundamental change from paper to electronic media will require the involvement of information systems professionals who are familiar with the specific requirements of their particular organization. The lead times to obtain benefits of optical storage is going to be longer than other major systems changes which have occurred, such as personal computers. The time to get started is now.
- At the very least, IS management can get started by taking responsibility for all forms of optical storage technology, including CD ROMs. This implies the following:
 - A thorough evaluation and understanding of the potential technological impacts of optical storage.
 - An extension of the information systems view to include the paper work processes which extend from time of computer output (or receipt of paper documents) to the archiving of paper or micrographics images. In addition, it should be recognized that libraries are part of the information system.
 - An understanding of the finer distinctions of data, information, and knowledge with special emphasis upon quality.
- It is important to identify meaningful applications which can be cost-justified and implemented with minimum risk. The requirements for integrated optical storage systems extend beyond hardware and software. Important organizational and personnel considerations are involved in implementing such systems. Sensitivity to these issues is absolutely essential.



I.S. RESPONSIBILITIES

- Thoroughly Evaluate Technological Impact of Optical Storage
- Extend Systems View Beyond Current Computer Output
- Identify Applications and Requirements
- Consider Pilot Projects on Some Scale
- Work with Vendors on Software Requirements



CD ROM: USER APPLICATIONS

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CD ROM: USER APPLICATIONS

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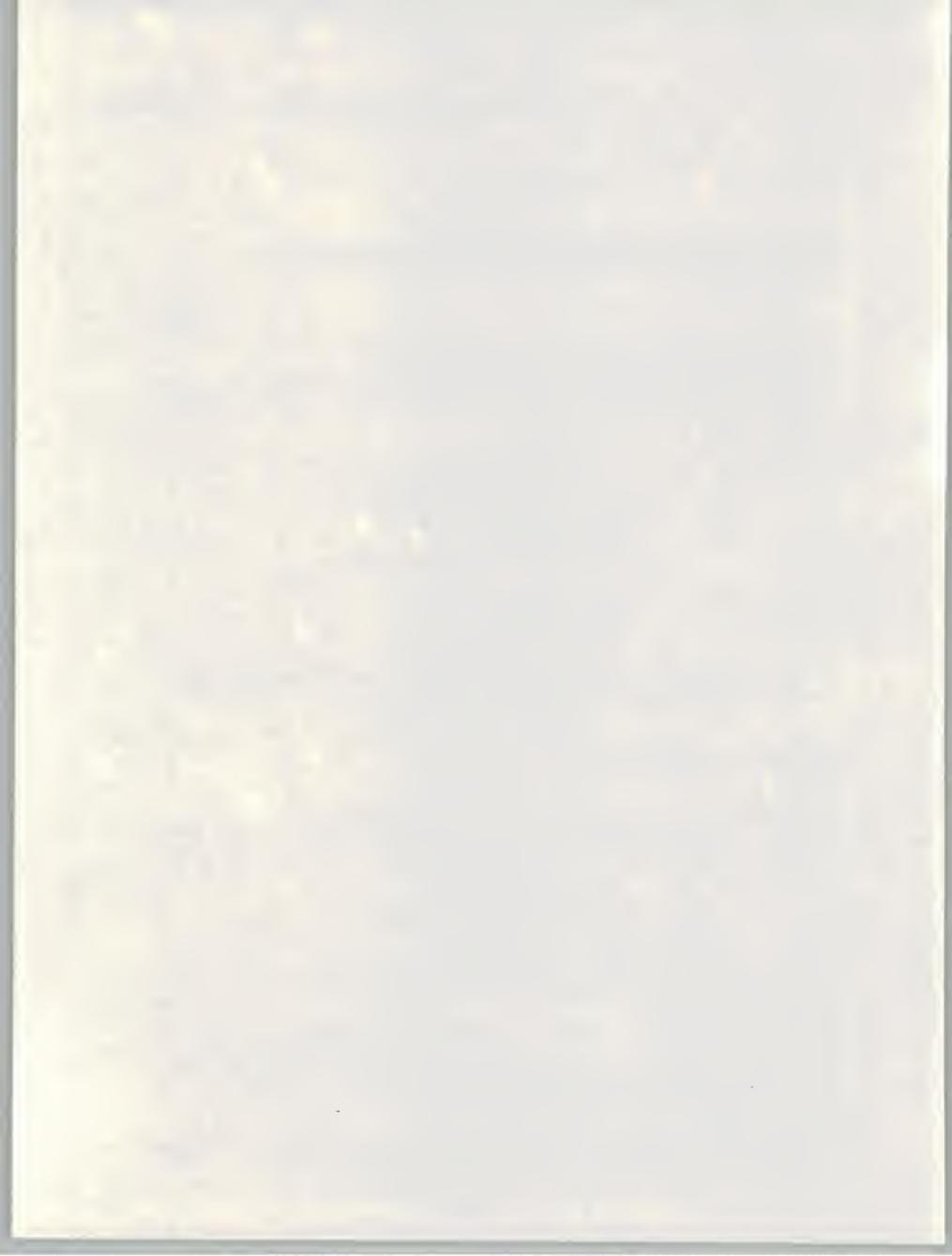
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- Budget distribution (personnel, hardware, computer services, communications, software, maintenance)
- And more!

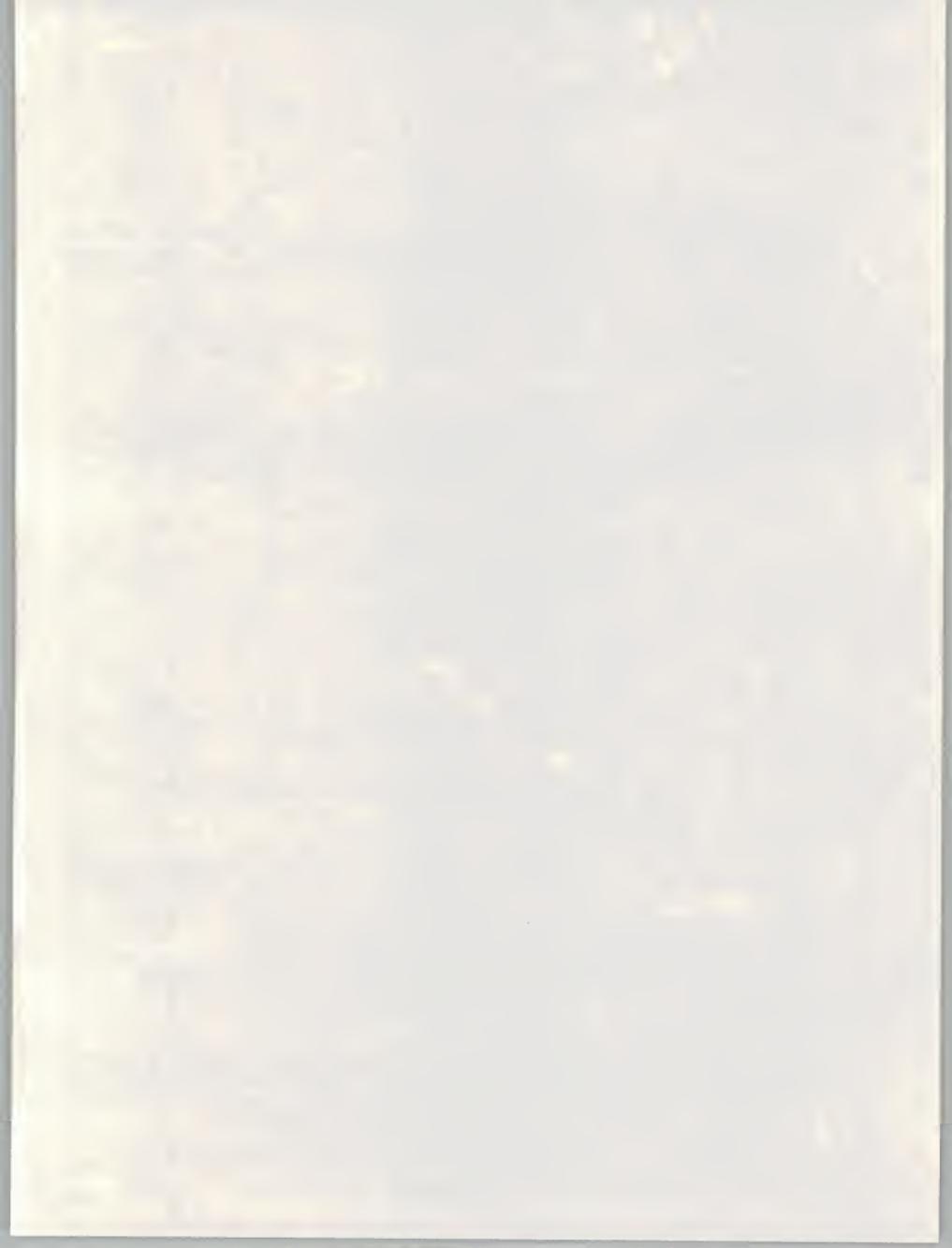
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